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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/497,865	02/04/2000	Donald C. D. Chang	PD-980034	7997

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HUGHES ELECTRONICS CORPORATION
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EXAMINER

ISSING, GREGORY C

ART UNIT	PAPER NUMBER
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3662

DATE MAILED: 10/10/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)
	09/497,865	CHANG ET AL.
	Examiner Gregory C. Issing	Art Unit 3662

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1) Responsive to communication(s) filed on 11 August 2003.

2a) This action is FINAL. 2b) This action is non-final.

3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4) Claim(s) 1-5 and 7-37 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5) Claim(s) _____ is/are allowed.

6) Claim(s) 1-5 and 7-37 is/are rejected.

7) Claim(s) _____ is/are objected to.

8) Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9) The specification is objected to by the Examiner.

10) The drawing(s) filed on _____ is/are: a) accepted or b) objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11) The proposed drawing correction filed on _____ is: a) approved b) disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12) The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a) All b) Some * c) None of:

- Certified copies of the priority documents have been received.
- Certified copies of the priority documents have been received in Application No. _____.
- Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14) Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) The translation of the foreign language provisional application has been received.

15) Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) Notice of References Cited (PTO-892)

2) Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) Information Disclosure Statement(s) (PTO-1449) Paper No(s) 24.

4) Interview Summary (PTO-413) Paper No(s). _____.

5) Notice of Informal Patent Application (PTO-152)

6) Other: _____.

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1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claim 37 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The claim remains indefinite due to the language "said receiver causing a transmission using the corresponding waveguide."

3. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

4. Claims 1, 4, 5, 7-9, 11, 13-18, 21-22 and 25-37 are rejected under 35 U.S.C. 103(a) as being unpatentable over Karlsson et al in view of Chiba et al, Chang et al, and Aoki et al.

5. Karlsson et al teach the use of a satellite terminal antenna that combines mechanical scanning in the azimuth direction and electronic one-dimensional scanning in the elevation direction wherein the antenna is rotated mechanically such that multiple satellites are within the elevation scanning plane of the antenna. Multiple beams are taught and shown for the purpose of simultaneously tracking the multiple satellites for providing soft handover. Karlsson et al differ from the claimed subject matter since the claimed digital beam former is not specified; Karlsson et al merely describe a phased array antenna. The progress in digital device technologies has led to the use of DBF antennas for use in commercial communication system, most suitably, mobile radio systems, as taught by Chiba et al. The advantageous features of DBF for use in phased array antennas as a replacement for analog beam forming are clearly identified therein. Chang et al describe a specific digital beam forming technique that is efficient and utilizes fewer ADCs

than conventional digital beam formers, resulting in lower power requirements, weight, complexity and cost; Figure 2 exemplifies the technique, including the claimed "multiplexor" 180, "analog to digital converter" 198, and "circuitry for forming multiple digital beam forms" 130. A digital receiver is inherent. Aoki et al teach antenna system having digital processing wherein the antenna provides beams which are automatically transmitted in the direction of arrival of the incoming received signals as would be desired in a communication system.

6. It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Karlsson et al by using/substituting a digital beam former for the electronically scanned antenna beams in view of the progress in such direction in the art as shown by either one of Chiba et al for the reasons set forth above. Moreover, it would have been further obvious to one having ordinary skill in the art to modify the digital beam former by using the DBF technique expressed by Chang et al so as to provide a lightweight and less costly device for a user terminal. Additionally, it would have been obvious to further modify the prior art to provide an adaptive antenna array wherein the received signals are utilized to process a transmission signal in the direction of the received signal in order to facilitate communication therebetween in view of the teaching of Aoki et al. The combination of references make obvious the claimed subject matter wherein the specifics of the claimed digital beam former are explicitly shown by the Chang et al reference. The dependent features are either shown or made obvious by the combination of references.

7. The applicants argue each of the references individually while the rejection is based on a combination of the references. In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the

rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

8. Firstly, the Applicants argue “(n)o teaching or suggestion is provided for the retrodirective function. That is, no coding is performed on the system to determine the strongest signal direction.” This argument is not persuasive and it fails to argue the claimed subject matter. Additionally, the relationship between the first statement’s “retrodirective function” and the second statement’s alleged equivalency “that is . . . coding to determine the strongest signal direction” is neither a claim limitation nor accurate.

9. Briefly, Applicants argue (1) that Karlsson et al do not teach a digital beamformer, multiplexer, ADC and retrodirectivity; (2) that Chiba et al do not teach retrodirectivity nor coding to determine the strongest signal; (3) Chang et al do not teach coding for retrodirectivity; and (4) Aoki et al do not teach use in combination with a rotating plate and radiation elements on the plate, determining a strongest signal and locking onto the strongest signal. The applicants substantially repeat the arguments set forth in the last response that none of the references teach or suggest retrodirectivity. Minor amendments were made to overcome a rejection under 35 USC 112 but no changes have been made to overcome the rejection over art.

10. Applicants allege novelty of the use of retrodirectivity utilizing the claimed digital beamforming device arguing that none of the references suggest retrodirectivity. This is not persuasive since Aoki et al is cited specifically for such feature. Additionally, each of the references is directed to a communication system using an antenna array having some form of scanning multiple beams. Several teach adaptive arrays. In any communication system utilizing directional antenna beams between first transceiver and a second transceiver, it is obvious if not

inherent to utilize received information of the beam as an aid to directing a return response in the direction of the received signal. Thus, every communication antenna is effectively retrodirective, that is, using the direction of arrival of a received signal to transmit a signal in the same direction. Additionally, note that the claims as now amended merely state that the “corresponding element can be used for transmission”; every antenna is reciprocal, thus, each and every antenna element “can be used for transmission”. Furthermore, the digital beamforming is made obvious in light of Chiba et al. Additionally, Chiba et al disclose the use of digital beamforming for providing multiple beams covering an area and selecting the beam with the maximum receiving power. Then, in a mobile satellite communication, the satellite signal is captured. Further, Chiba et al disclose an advantage of the use of DBF for adaptive array signal processing. Adaptive arrays have the inherent feature of placing nulls in the directions of interferences as well as one or more main lobes in the directions of desired targets. In view of the fact that Chiba et al, as well as all of the other references, are directed to a communication system, transmission and reception are inherent. Lastly, Aoki et al show the conventionality and well-known features of a retrodirective antenna. The specific embodiment shown therein is non-limiting; thus, the applicants’ allegation that due to the antenna being fixed in Aoki as opposed to rotating as in the claims, there would be no suggestion to use is not persuasive since the concept of retrodirectivity is clearly suggested and utilized for the sake of improving communications.

11. Claims 2, 3, 10, 12, 19, 20 and 23-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combined prior art set forth above as applied to claims above, and further in view of Ajioka and Barrett et al.

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12. Karlsson et al in view of Chiba et al, Chang et al and Aoki et al teach a satellite communication retrodirective terminal having mechanical azimuth scanning and electronic elevation scanning using digital beam forming techniques that allow for soft handover as set forth above. The combined prior art fails to specify the electronically scanned antenna array as comprising cross-slotted waveguides, each including a septum. Ajioka teach the conventionality of a cross-slotted waveguide having a septum for use in a phased array antenna. Barrett et al teach the conventionality of a slotted antenna array for use in a satellite communication terminal wherein azimuth scanning can be achieved mechanically and elevation scanning can be achieved electronically. In view of the conventionality of cross-slotted waveguides in scanning antenna arrays as shown by each of Ajioka and Barrett et al, it would have been obvious to one having ordinary skill in the art to modify the scanning antenna arrays of either one of Richards et al or Karlsson et al by substituting a cross-slotted waveguide array. Ajioka further shows the use of a septum for controlling characteristics of the antenna output.

13. Applicants argue that neither Ajioka nor Barrett et al teach beamfoming or the retrodirective aspects of the claims. However, each of these references are cited for separate reasons as set forth above. The limitations of retrodirectivity and beamforming are known and shown by previously cited references.

14. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after

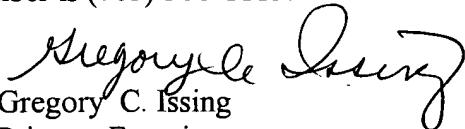
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the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Gregory C. Issing whose telephone number is (703)-306-4156. The examiner can normally be reached on Mon-Thurs 6:30-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Thomas Tarcza can be reached on (703)-306-4171. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-1113.


Gregory C. Issing
Primary Examiner
Art Unit 3662

gci